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Association between Parental Addiction and Unintentional Childhood Poisoning

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Abstract

Background

Children that living with addicted parents are at risk for intentionally and unintentionally poisoning. Present study aimed to evaluate the effect of parental addiction on unintentional childhood poisoning.

Materials and Methods: Totally, 140 admitted children with poisoning in Loghman hospital, Tehran-Iran, as referral center were recruited from March 2013 to July 2014. Cases were matched with 280 controls by age (within a caliper of six months), gender, and date of hospital attendance in Tehran, Iran. Parents were interviewed using an objective checklist about the risk factors of childhood poisoning. Conditional logistic regression with within-group varying weights was used to adjust for measured confounders. Vary weights within the matched set was defined by inverse probability weighting (IPW).

Results: Sixty-two of cases (74.7%) were poisoned with Methadone. The odds ratio [OR] 95% confidence interval [CI] of having addicted parents in poisoned children compared to the controls in three scenarios of ordinary, un-stabilized weighted and stabilized weighted conditional regression logistic ORs (95% CI) were 17.3 (8.7, 34.6), 2.6 (1.9, 3.3) and 3.6 (2.9, 4.3) respectively.

Conclusion

The results indicate that child abuse and neglect have been linked to parental substance abuse. Education on preventive interventions such as safe storage of methadone and store poisoning product out of reach and sight of children are necessary in substance abusing families.

Key Words: Child, Iran, Poisoning, Parents, Substance-Related Disorders.

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1- INTRODUCTION

Poisoning is one of the most important injuries, which mostly occurs during childhood. Statistics showed poisoning is the fourth reason of death among injuries (1). In high income countries, incidence of unintentional poisoning is 429.4 per 1000 children (2) in addition, in low and middle income countries unintentional childhood poisoning were 1.6/100,000 and 1.7/100,000 children, respectively (3). It is estimated that mortality rate of poisoning in children in low and middle income countries in EMRO region is 1.6 per 100,000 children (3). The conducted studies in Iran showed that the incidence of unintentionally childhood poisoning is considerable. Most cases of poisoning were occurred in boys and among children under five years and they were as result of methadone intoxication (4, 5).

Many risk factors are introduced for unintentional childhood poisoning, such as child home environments, socioeconomic status, unsafe storage of poison products and parents characterises (6-8). Parental addiction may be a cause for poisoning in children living with them. Studies have showed that children of narcotic addicted parents, are more likely to be poisoned with opium, in other hand, harm-reduction-based methadone treatment in parents increases accidental ingestion of methadone by their children (7, 9, 10). The previous studies demonstrated that unsafe storage of methadone and poisoning products and availability to hazardous chemicals and medicines in substance abusing families can be a cause of unintentional childhood poisoning (4-7). The evidences on relationship between parental addiction and childhood poisoning mainly come from the observational studies. The derived associations from observational studies are prone to confounding. For example effect of parental addiction on unintentional childhood poisoning will be probably mixed with the effect of risk factors such as parental smoking that is related with both addiction in parents and unintentional childhood poisoning. Using by advanced methods such as causal inference in observational studies can derive true effect of parental addiction on childhood poisoning, then present study aimed to infer causal effect of addiction in parents on unintentional childhood poisoning in a case-control study.

2- MATERIALS AND METHODS

2-1. Study Design and Population

In a hospital based case-control study 140 child admitted to the emergency department with acute poisoning were matched with 280 controls from respiratory care and infection control department by age (within a calliper of six months), gender, and date of hospital attendance at March to July 2013 in referral centre of Loghman Hospital in Tehran, Iran. Using an objective checklists a structure interview with parents data were obtained on the type of poisoning, risk factors of poisoning including maternal occupation, paternal educational status, paternal smoking status, previous poisoning, addiction in the one or both parents, and mental illness in the family members (7, 11).

2-2. Measuring tools/ checklist

In our study, all children and their guardians were then interviewed by the same person using a check-list that covered demographic, behavioural, and risk factors of accidental poisonings. The nature of the study did not allow blinding of the interviewer with respect to case-control status of the child. For cases, information was also, obtained concerning type and conditions of poisoning. Considering that the majority of the variables in this check-list had objective nature; for this check-list do not reliability and validity; of course was

consulted with two statistician and three epidemiologist experts in the field, they also had the same opinion. In this check-list, content validity measured by relying on the knowledge of specialists poisoning who were familiar with the construct being measured. These subject-matter experts were usually provided with access to the check list and were asked to provide feedback on how well each question measures the construct in question. Then their feedback analysed that there was sufficient agreement between them in the field of content validity.

2-3. Inclusion criteria

Inclusion criteria for cases were children aged less than 15 years who had been taken to the paediatric poisoning department of Loghman hospital, Tehran-Iran, and also for controls were children who were taken to the outpatient clinics of the hospital with suspected problems of the respiratory and digestive system or with infectious diseases.

2-4. Exclusion criteria

Neurological and metabolic diseases, brain infection and trauma were considered as exclusion criteria and this people were omitted from the control group.

2-5. Ethical considerations

The ethics committee of Loghman hospital, Tehran- Iran, approved the study and all of the children parents provided written informed consent. Participation in the study was voluntary and the questionnaires had no name. Data were extracted all the questionnaires, in general.

2-6. Data analyses

Inverse probability weighting (IPW) was used to estimate the effect of parental addiction in which it is independent of the measured confounders in a pseudo population. For causal inference methods such as IPW, it is necessary that based on the studied sample a pseudo population be simulated. As, a randomized clinical trials, in pseudo population individuals be randomized in two groups with and without addicted parents.

The individual in studied sample will be copied in pseudo population with a weight that is inversed of conditional selection probability. In IPW methods, conditional selection probability entering into parental addiction groups (Yes or No) was estimated by conducting multivariable logistic model with parental addiction as binary dependent variable and measured confounders including parental smoking, father education, mother education and parents with mental disorder as covariate. The inverse of the conditional probability was considered as un-stabilized weights. Participants are copied in pseudo population with these calculated weights. Very low estimated weights lead participation over copied in pseudo population, so stabilized weights were estimated by dividing marginal selection probability in addiction groups by conditional selection probability. Finally, conditional logistic regression with varying weights within the matched set ("wc logit" command in stata) was used to estimate the effect of parental addiction on poisoning in children.

The varying weights within the same matched set, was defined by IPW. Data were analyzed using the STATA version 12.0 statistical software. The level of significance was defined as $P \leq 0.05$.

3- RESULTS

In this study, 140 poisoned children and 280 controls were investigated. The results showed that the most common types of poisoning were related to narcotics 83 (58.6%) and medicinal products 42 (30%). Other types of poisoning include Chemical and Monoxide carbon and Unknown were 11 (7.9%), 3 (2.1%) and 2 (1.4%); respectively. Among the narcotics,

Methadone was the most frequent poisoning agent with 62 (74.7%). The distribution characteristics of poisoned children versus the control group by age, gender, maternal occupation, parental education, parental smoking status, parental addiction, household of size, location of Residence and parental mental disorder are shown in **Table.1**.

Univariate logistic regression showed that the all measured confounders were significantly related with unintentional childhood poisoning, strongest effect was for parental smoking, OR (95% CI): 7.3 (4.3, 12.2), it means the odds of having parental smoking in cases is 6.3 time of controls (**Table.2**).

The mean un-stabilized weight and standard deviation (SD) in case and control groups were 13.1± 21.4 and 1.4± 0.81, respectively. For stabilized weight mean (SD) in case and control group were 4.4±7.1 and 0.93+0.54, respectively (**Figure.1**).

The main logistic regression analyses indicated that addiction in parents have a very strong positive effect on un-intentional poisoning. In two conditional logistic model with un-stabilized weighted and stabilized weighted models compared to controls group, poisoned children have the odds of 1.6 and 2.6 times that their parents addicted to substance, respectively (**Table.3**).

Table-1: Demographic characteristics of children in control (n=280) and case (n=140) groups

Variable	Cases (%)	Controls (%)
Age (year)		
≤1	16(11.4)	40(14.3)
2-4	84(60)	164(58.6)
>5	40(28.6)	76(27.1)
Gender		
Male	80(57.1)	160(57.1)
Female	60(42.9)	120(42.9)
Maternal occupation		
Housewife	123(87.9)	264(94.3)
Other	17(12.1)	16(5.7)
Mother education		
Academic	13(9.3)	49(17.5)
Non-academic	127(90.7)	231(82.5)
Father education		
Academic	16(11.4)	69(24.7)
Non-academic	124 (88.6)	211(75.3)
Paternal smoking		
No	43(30.8)	215(76.9)
Yes	97(69.2)	65(23.1)
Parental addiction		
No	53(37.9)	259(92.5)
Yes	87(62.1)	21(7.5)
Parental Mental disorder		
No	110(78.6)	265(94.6)
Yes	30(21.4)	15(5.4)
Location of Residence		
City	133(95)	259(92.5)
Village	7(5)	21(7.5)
Household of size		
< 4	42(30)	128(45.7)
≥4	98(70)	152(54.3)

Table-2: Characteristics of the study participants, univariate conditional logistic regression analyses showing odds ratio (ORs), with the corresponding 95 % confidence intervals (CIs)

Variables	Control (n=280)	Case (n=140)	OR (95%CI)	P-value
Parental smoking				
Yes	65 (23.1)	97 (69.2)	7.3 (4.3, 12.2)	<0.001
Maternal occupation				
Yes	16 (5.7)	17 (12.1)	2.2 (1.1, 4.5)	0.04
Parental Mental disorder				
Yes	15 (5.3)	30 (21.4)	4.6 (2.3, 9.1)	<0.001
Mother education				
No	3 (2)	6 (4.2)	4 (1, 15)	0.05
Father education				
No	7 (2.5)	11 (7.8)	3.1 (1.2, 8.1)	0.01

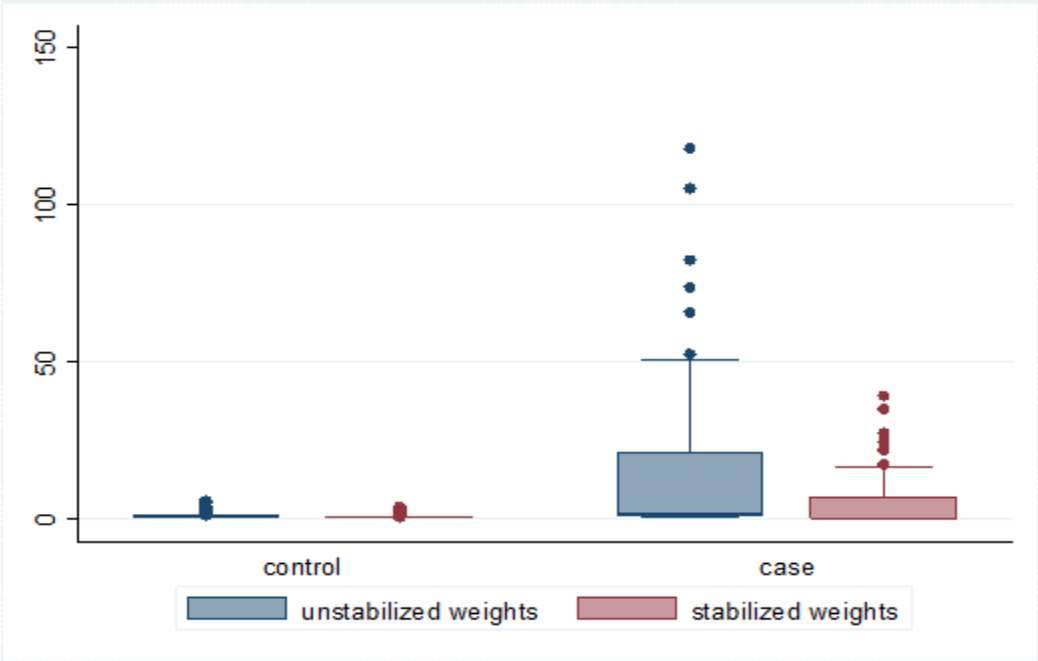

Fig.1: Box plot of un-stabilized and stabilized weights in case and control groups

Table-3: The comparison between ordinary odds ratio and weighted odds ratios

Variable	Control (n=280)	Case (n=140)	Ordinary conditional regression logistic	Weighted estimate (un-stabilized)	Weighted estimate (stabilized)
Parental addiction					
Yes	21 (7.5)	87 (62.1)	17.3 (8.7, 34.6)	2.6 (1.9, 3.3)	3.6 (2.9, 4.3)

4- DISCUSSION

To our knowledge, this research is the first study, to attempt clarify the causal effect of parental addiction on risk of poisoning in children that living in the homes with them. Our results showed that most cases of childhood poisoning were boys and it was as result of unintentional methadone intoxication. The estimated ORs of parental addiction on unintentional

childhood poisoning in two scenario of causal inference were 3.6 and 2.6. It means with removing confounding effect, odds of having addicted parents in cases are 2.6 and 1.6 times of controls.

One of important justification in injury epidemiology is poisoning in children that is introduced as a common and neglect injury in all countries (1, 12, 13). For conducting efficient preventive intervention, it is necessary that valid and unbiased effects be estimated. The results of the present study verified the previous studies in Iran and other countries (5, 14, 15), that there is a gender distribution of childhood poisoning as most cases of poisoning were seen in the boys.

All children were poisoned in present study with poison products, unintentionally and accidentally. As well as, poisoned children were under 12 years, so the role of some risk factors such as characteristics of parents can be more pivotal than other risk factors. Our analysis based on classic logistic regression found some parent's characteristics such as parental smoking and parental education can increase the incidence of unintentional poisoning in children that among the studied parent's characteristics, parental substance abuse had strongest effect; OR (95% CI): 17.3 (8.7, 34.6). Although, upper limit of odds ratio is infinite, but because of multifactorial aetiology in chronic diseases, observing very large odds ratio can be rare event, so the present study aimed to infer a causal effect about parental substance abuse and the effect remained significant for parental substance abuse when measured confounders were controlled. Childhood poisoning can arise directly from parental addiction as a by-product in some mechanisms. Previous studies demonstrated that ability of child supervision among drug addicted parents will be decreased (16, 17) and some behaviours such as keeping out of reach and safe storage of poison products won't be well-established in addicted parents (4, 18). Our results showed that most of children were poisoned so that number (%) of narcotic products was 83 (56.8). Among the narcotic products, Methadone 62 (74.7), Opium 10 (12), Cannabis 1 (1.2) and Amphetamine 10 (12.1) had highest frequency respectively. The higher figure of accidental methadone ingestion in children probably is as result of unsafe storage of methadone when parents are in harm-reduction-based methadone treatment. It has been argued that methadone users may not perceive the risk poisoning in children by methadone (19).

One study suggested that non-medicinal poison products usually stored at low adult eye levels places (20), so methadone syrup may be stored in downstairs of refrigerator or storage in soda bottles, glasses or water bottles that are likely to be accessible for children. The effects of parental addiction on poisoning in children can emphasize the education of parents on how their actions affect their children. If a parents be aware of the adverse outcomes that substance and/or poisoning products can do to their children, they may perceive that it is not noteworthy to continue with this behaviour or they may apply preventive and supporting interventions such as safe storage of poison products in the direction of decrease in poisoning in children (21).

4-1. Limitations of the study

Some limitations of present study should be considered. First, some measured confounders are missed in our analysis, so that other confounding variables such as maternal smoking that is more prevalent in other countries may change the effect of parental addiction.

Second, all addicted substances aggregated in one variable named parental addiction may be along with bias e.g. effect of parental cannabis abuse may be different from effect of Methadone when parents are in maintenance treatment phase and to

clarify this matter comprehensive studies are recommended.

5. CONCLUSION

In summary, in a causal inference approach if children have addicted parents are more likely to be unintentionally poisoned. Training on preventive interventions such as safe storage of methadone and store poisoning product out of reach and sight of children in substance abusing families and promoting the health literacy of addicted parents can be considered to diminish the incidence of poisoning in children.

6- CONFLICT OF INTEREST

The authors have no conflicts of interest to declare for this study.

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